

ECP WR-015 R1 Cover sheet and explanation

Attached file is the revised ECP package for the UH and OH software upgrade. Changes from the original ECP:

- 1) Added OH receiver to all configuration callouts
- 2) Removed OH receiver from block 28 (other systems affected)
- 3) Added B-5 spec to list of affected docs
- 4) Added estimated costs (Sheet 4 of ECP form)

This is being processed as a change to the original ECP, since the basic purpose and technical description have not changed.

ENGINEERING CHANGE PROPOSAL (ECP), PAGE 1					1. DATE (YYMMDD) 98/02/04		Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 2 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503. PLEASE DO NOT RETURN YOUR COMPLETED FORM TO EITHER OF THESE ADDRESSES. RETURN COMPLETED FORM TO THE GOVERNMENT ISSUING CONTRACTING OFFICER FOR THE CONTRACT/PROCURING ACTIVITY NUMBER LISTED IN ITEM 2 OF THIS FORM.							2. PROCURING ACTIVITY NO.	
							3. DODAAC	
4. ORIGINATOR			b. ADDRESS (Street, City, State, Zip Code) WR-ALC/LKNA (SFAE-CM-GPS-GFO) Robbins AFB, GA 31098-5000			5. CLASS OF ECP Class 1		
a. TYPED NAME (First, Middle Initial, Last) Johnny Walker						6. JUST. CODE D		7. PRIORITY U
8. ECP DESIGNATION						9. BASELINE AFFECTED		
a. MODEL/TYPE GPS UH,OH Rcvr		b. CAGE CODE 13499		c. SYSTEM DESIGNATION R-2400()/A, R-2399()/A		<input type="checkbox"/> FUNCTIONAL <input type="checkbox"/> ALLOCATED		<input checked="" type="checkbox"/> PRODUCT
d. ECP NO. WR-015 R1				e. TYPE F		f. REV		10. OTHER SYS./CONFIG. ITEMS AFFECTED
						<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
11. SPECIFICATIONS AFFECTED					12. DRAWINGS AFFECTED			
	CAGE Code	Specification/Document No.	Rev.	SCN	CAGE Code	Number	Rev.	NOR
a. SYSTEM						See attachment, Blk 12		
b. DEVELOPMENT								
c. PRODUCT		See page 2, Blk 33						
13. TITLE OF CHANGE Correction of GPS Receiver UH & OH Software Anomalies.								
14. CONTRACT NO. AND LINE ITEM N/A					15. PROCURING CONTRACTING OFFICER			
					a. NAME (First, Middle Initial, Last)			
					b. CODE		c. TELEPHONE NO.	
16. CONFIGURATION ITEM NOMENCLATURE Receiver, Radio UH, R-2400G/A. Receiver, Radio OH, R-2399F/A								17. IN PRODUCTION
								<input type="checkbox"/> YE <input checked="" type="checkbox"/> NO
18. ALL LOWER LEVEL ITEMS AFFECTED								
a. NOMENCLATURE See page 8, Blk 18					b. PART NO.		c. NSN	
19. DESCRIPTION OF CHANGE See attachment Block 19								
20. NEED FOR CHANGE See attachment Block 20								
21. PRODUCTION EFFECTIVITY BY SERIAL NUMBER NA					22. EFFECT ON PRODUCTION DELIVERY SCHEDULE NA			
23. RETROFIT								
a. RECOMMENDED ITEM EFFECTIVITY All GPS UH & OH Receivers, R-2400G/A and R-2399F/A					b. SHIP/VEHICLE CLASS AFFECTED Multiple			
c. ESTIMATED KIT DELIVERY SCHEDULE NA					d. LOCATIONS OR SHIP/VEHICLE NUMBERS AFFECTED Multiple			
24. ESTIMATED COSTS/SAVINGS UNDER CONTRACT					25. ESTIMATED NET TOTAL COSTS/SAVINGS \$ 625K			
26. SUBMITTING ACTIVITY					b. TITLE			
a. AUTHORIZED SIGNATURE								
27. APPROVAL/DISAPPROVAL								
a. CLASS I			b. CLASS II			c. CLASS III		
<input type="checkbox"/> APPROVAL <input type="checkbox"/> RECOMMENDED			<input type="checkbox"/> DISAPPROVAL <input type="checkbox"/> RECOMMENDED			<input type="checkbox"/> APPROVED <input type="checkbox"/> DISAPPROVED		
						<input type="checkbox"/> CONCUR IN CLASSIFICATION OF CHANGE <input type="checkbox"/> DO NOT CONCUR IN CLASSIFICATION OF CHANGE		
d. GOVERNMENT ACTIVITY					e. SIGNATURE		f. DATE SIGNED (YYMMDD)	
g. APPROVAL		h. GOVERNMENT ACTIVITY			i. SIGNATURE		j. DATE SIGNED (YYMMDD)	
<input type="checkbox"/> APPROVED <input type="checkbox"/> DISAPPROVED								

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EFFECTS ON FUNCTIONAL/ALLOCATED CONFIGURATION DOCUMENTATION**28. OTHER SYSTEM AFFECTED**

All first generation GPS Receivers are affected.

3A RCVR: R-2332 ()

3S RCVR: R-2331 ()

29. OTHER CONTRACTORS/ACTIVITIES AFFECTED

WR-ALC and TYAD GPS Depots

30. CONFIGURATION ITEMS AFFECTED

See continuation, block 30

31. EFFECTS ON PERFORMANCE ALLOCATIONS AND INTERFACES IN SYSTEM SPECIFICATION

System will once more respond to CDU commands even when PRN30 is visible. Increased accuracy of the navigation solution and velocity data output to host vehicle in terms of position (x, y, & z) and velocity (Vx, Vy, & Vz). It should be noted that the updated receiver still meets the performance requirements of the allocated, product and interface specifications. Interface impact to ICD 150 and ICD 152 to incorporate a sixth bit for PRN number. Draft PIRNs have been submitted.

32. EFFECTS ON EMPLOYMENT, INTEGRATED LOGISTICS SUPPORT, TRAINING, OPERATIONAL EFFECTIVENESS OR SOFTWARE

TOs and TMs need to be updated to reflect the new configurations of the UH and OH receivers, and the six CCAs listed in Block 18. Depot Test Programs for SRUs must be updated to work with new software loads.

33. EFFECTS ON CONFIGURATION ITEM SPECIFICATIONS

CI-RCVR-3013A, CI-RCVR-3017A (UH, OH Prime Item Product Fabrication Spec "C-1") - update to reflect new software version

CP-RCVR-3013C, CP-RCVR-3017A Part I (UH, OH CPCI Development Specification - "B-5") - update to reflect new MagVar and Map Datum requirements.

CP-RCVR-3013C, CP-RCVR-3017C (UH, OH CPCI Product Specification - "C-5") - Update to reflect all changes.

34. DEVELOPMENTAL REQUIREMENTS AND STATUS**35. TRADE-OFFS AND ALTERNATIVE SOLUTIONS****36. DATE BY WHICH CONTRACTUAL AUTHORITY IS NEEDED (YYMMDD)**

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EFFECTS ON PRODUCT CONFIGURATION DOCUMENTATION, LOGISTICS AND OPERATIONS

(X)	FACTOR	ENCL.	PAR.	(X)	FACTOR	ENCL.	PAR.
	37. EFFECT ON PRODUCT CONFIGURATION DOCUMENTATION OR CONTRACT				39. EFFECT ON OPERATIONAL EMPLOYMENT		
X	a. PERFORMANCE	1			a. SAFETY		
	b. WEIGHT-BALANCE-STABILITY (Aircraft)				b. SURVIVABILITY		
	c. WEIGHT-MOMENT (Other equipment)				c. RELIABILITY		
	d. CDRL, TECHNICAL DATA				d. MAINTAINABILITY		
X	e. NOMENCLATURE	1			e. SERVICE LIFE		
					f. OPERATING PROCEDURES		
	38. EFFECT ON INTEGRATED LOGISTICS SUPPORT (ILS) ELEMENTS				g. ELECTROMAGNETIC INTERFERENCE		
					h. ACTIVATION SCHEDULE		
X	a. ILS PLANS	1			i. CRITICAL SINGLE POINT FAILURE ITEMS		
	b. MAINTENANCE CONCEPT, PLANS AND PROCEDURES				j. INTEROPERABILITY		
X	c. LOGISTICS SUPPORT ANALYSES	1					
	d. INTERIM SUPPORT PROGRAMS						
X	e. SPARES AND REPAIR PARTS	1			40. OTHER CONSIDERATIONS		
X	f. TECH MANUALS/PROGRAMMING TAPES	1		X	a. INTERFACE	1	
	g. FACILITIES				b. OTHER AFFECTED EQUIPMENT/GFE/GFP		
	h. SUPPORT EQUIPMENT				c. PHYSICAL CONSTRAINTS		
	i. OPERATOR TRAINING			X	d. COMPUTER PROGRAMS AND RESOURCES	1	
	j. OPERATOR TRAINING EQUIPMENT				e. REWORK OF OTHER EQUIPMENT		
	k. MAINTENANCE TRAINING				f. SYSTEM TEST PROCEDURES		
	l. MAINTENANCE TRAINING EQUIPMENT				g. WARRANTY/GUARANTEE		
	m. CONTRACT MAINTENANCE				h. PARTS CONTROL		
	n. PACKAGING, HANDLING, STORAGE, TRANSPORTABILITY				i. LIFE CYCLE COSTS		
X	o. Depot Maintenance	1					

41. ALTERNATE SOLUTIONS

Primary failure mode is CDU lockup whenever PRN30 is visible. Only practical workaround is not to operate when PRN30 is visible. Since this prevents operations in much of the world for up to 8 hours/day, this is an unacceptable workaround.

42. DEVELOPMENTAL STATUS

UH Receiver CPCI coding changes to implement fixes for the deficiencies defined in Blocks 19 & 20 have been developed and tested by the ISF WR-ALC, and by PM SEMA on RC-12 aircraft. OH changes are in work at ISF.

43. RECOMMENDATIONS FOR RETROFIT

All UH & OH receivers in the inventory should be force retrofitted to the new configurations (R-2400 J/A, AF CAGE 98752, part # 9729866, and R-2399G/A, AF CAGE 98752, part # 9729890)

44. WORK-HOURS PER UNIT TO INSTALL RETROFIT KITS

a. ORGANIZATION	b. INTERMEDIATE	c. DEPOT	d. OTHER
-----------------	-----------------	----------	----------

45. WORK-HOURS TO CONDUCT SYSTEM TESTS AFTER RETROFIT

46. THIS CHANGE MUST BE ACCOMPLISHED

<input type="checkbox"/> BEFORE	<input type="checkbox"/> WITH	<input type="checkbox"/> AFTER THE FOLLOWING CHANGES
---------------------------------	-------------------------------	--

47. IS CONTRACTOR FIELD SERVICE ENGINEERING REQUIRED?

<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
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48. OUT OF SERVICE TIME

49. EFFECT OF THIS ECP AND PREVIOUSLY APPROVED ECP'S ON ITEM

None

50. DATE CONTRACTUAL AUTHORITY NEEDED FOR (YYMMDD)

a. PRODUCTION

b. RETROFIT

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51. ESTIMATED NET TOTAL COST IMPACT (Use parentheses for savings)

FACTOR	COST / SAVINGS UNDER CONTRACT					Other Costs/ Savings to the Government (f)
	Non- Recurring (a)	RECURRING			Total (e)	
		Unit (b)	Quantity (c)	Total (Recurring) (d)		
a. PRODUCTION COSTS / SAVINGS						
(1) CONFIGURATION ITEM / CSCI						
(2) FACTORY TEST EQUIPMENT						
(3) SPECIAL FACTORY TOOLING						
(4) SCRAP						
(5) ENGINEERING, ENGINEERING DATA REVISION	7					
(6) REVISION OF TEST PROCEDURES						
(7) QUALIFICATION OF NEW ITEMS						
(8) SUBTOTAL OF PROD COSTS / SAVINGS	7					
b. RETROFIT COSTS						
(1) ENGINEERING DATA REVISION						
(2) PROTOTYPE TESTING						
(3) KIT PROOF TESTING	1.1					
(4) RETROFIT KITS FOR OPERATIONAL SYSTEMS						
(5) PREP. OF MWO/TCTO/SC/ALT/TD	10					
(6) SPECIAL TOOLING FOR RETROFIT						
(7) INSTALLATION - CONTRACTOR PERSONNEL						
(8) INSTALLATION - GOVERNMENT PERSONNEL						180
(9) TESTING AFTER RETROFIT						
(10) MODIFICATION OF GFE/GFP						
(11) QUALIFICATION OF GFE/GFP						
(12) SUBTOTAL OF RETROFIT COSTS/SAVINGS	11.1					180
c. INTEGRATED LOGISTICS SUPPORT COSTS/ SAVINGS						
(1) SPARES/REPAIR PARTS REWORK						
(2) NEW SPARES AND REPAIR PARTS						
(3) SUPPLY/PROVISIONING DATA						
(4) SUPPORT EQUIPMENT	45					
(5) RETROFIT KITS FOR SPARES						
(6) OPERATOR TRAINING COURSES						
(7) MAINTENANCE TRAINING COURSES						
(8) REVISION OF TECH MANUALS						
(9) NEW TECH MANUALS						
(10) TRAINING/TRAINERS						
(11) INTERIM SUPPORT						
(12) MAINTENANCE MANPOWER						
(13) COMPUTER PROGRAMS/DOCUMENTATION	400					
(14) SUBTOTAL OF ILS COSTS/SAVINGS	445					
d. OTHER COSTS/SAVINGS						
e. SUBTOTAL COSTS/SAVINGS	463.1					180
(1) SUBTOTAL UNDER CONTRACT						
f. COORDINATION OF CHANGES WITH OTHER CONTRACTORS						
g. COORDINATION CHANGES BY GOVERNMENT						
h. ESTIMATED NET TOTAL COSTS/SAVINGS						625

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ECP NUMBER
WR-015**52. ESTIMATED COSTS/SAVINGS SUMMARY, RELATED ECP'S** (Use parentheses for savings)

	CAGE CODE (a)	ECP NUMBER (b)	COST/SAVINGS UNDER CONTRACTS (c)	OTHER COSTS/SAVINGS TO GOVERNMENT (d)
a. PRODUCTION COSTS/SAVINGS (Subtotal of Costs/Savings Elements from Page 4, item 4.a., applicable to aircraft, ship, tank, vehicle, missile or its subsystem)				
(1) SUBTOTAL PRODUCTION COSTS/SAVINGS				
b. RETROFIT COSTS (Applicable to aircraft, ship, tank, vehicle, missile or its subsystem)				
(1) SUBTOTAL RETROFIT COSTS				
c. INTEGRATED LOGISTICS SUPPORT COSTS/SAVINGS REVISED REQUIREMENTS				
(1) ITEM RETROFIT (If not covered under "b") (Applicable to aircraft, ship, tank, vehicle, missile or its subsystem)				
(2) ILS SUBTOTAL (Applicable to aircraft, ship, tank, vehicle, missile or its subsystem)				
(3) OPERATOR TRAINER (Net total cost/saving from each ECP covering operator trainer)				
(4) MAINTENANCE TRAINER (Net total cost/saving from each ECP covering maintenance trainer)				
(5) OTHER TRAINING EQUIPMENT				
(6) SUPPORT EQUIPMENT (Net total cost/saving from each ECP on support equipment)				
(7) ILS PLANS				
(8) MAINTENANCE CONCEPT, PLANS, SYSTEM DOCUMENTS				
(9) INTERIM SUPPORT PLAN				
NEW REQUIREMENTS	CAGE CODE	NON-RECURRING COSTS	RECURRING COSTS	
			UNIT QTY TOTAL	
(10) PROVISIONING DOCUMENTATION				
(11) OPER TRNR/TRNG DEVICES/EQUIP				
(12) MANUALS/SPARES, REPAIR PARTS (For (11))				
(13) MAINTENANCE TRNR/TRNG DEVICES/EQUIPMENT				
(14) MANUALS/SPARES, REPAIR PARTS (For (13))				
(15) SUPPORT EQUIPMENT				
(16) MANUALS (For (15))				
(17) PROVISIONING DOCUMENTATION (For (15))				
(18) REPAIR PARTS (For (15))				
(19) SUBTOTAL ILS COSTS/SAVINGS (Sum of c(1) through c(18))				
d. OTHER COSTS/SAVINGS (Total from page 4, item 4.d., or related ECP's)	CAGE CODE	ECP NUMBER		
(1) TOTAL OTHER COSTS/SAVINGS				
(2) SUBTOTALS OF COLUMNS				
(3) SUBTOTAL UNDER CONTRACT				
e. ESTIMATED NET TOTAL COSTS/SAVINGS (a + b + c + d)				

ECP WR-015 Continuation Sheet

BLK 12: DRAWINGS AFFECTED:

Old CAGE	OLD Number	Old REV	New CAGE	NEW Number	New REV	Name
98752	8836721	D	98752	8836721	E	UH System
13499	622-8075-060	B	98752	9729866	-	UH Rcvr LRU
13499	685-7521-020	C	98752	9729867	-	UH (060) Equipment Structure
13499	685-7591-060	A	98752	9729868	-	UH Software Configuration Index Drawing
13499	687-7302-001	D	98752	9729870	-	UH Interface Control Drawing
13499	687-1144	L	98752	9729871	-	UH ID Plate
13499	613-3226-051		98752	9729872	-	VDD Rcvr UH
13499	659-5463-050	B	98752	9729875	-	UH LBM Assy
13499	613-4495-051		98752	9729876	-	PROM data UH LBM
13499	676-2504-060	A	98752	9729883	-	UH AAMP Processor Assy
13499	613-7344-060		98752	9729884	-	PROM data UH AAMP Processor
98752	8836722	D?	98752	8836722	E?	OH System
13499	622-8076-060	B	98752	9729890	-	OH Rcvr LRU
13499	685-7520-020	C	98752	9729891	-	OH Equipment Structure
13499	685-7592-060	B	98752	9729892	-	OH Software Configuration Index Drawing
13499	687-7305-001	E	98752	9729894	-	OH Interface Control Drawing
13499	687-1145	M	98752	9729895	-	OH ID Plate
13499	613-3230-050	??	98752	9729896	-	VDD Rcvr OH (CSCI number)
13499	659-5464-050	A	98752	9729898	-	OH LBM Assy
13499	613-4497-050	??	98752	9729899	-	PROM data OH LBM
13499	676-2505-060	A	98752	9729900	-	OH AAMP Processor Assy
13499	613-7346-060	??	98752	9729901	-	PROM data OH AAMP Processor

BLK 19. DESCRIPTION OF CHANGE:

Position/velocity run-off (reported errors have exceeded 40 NM) can only be eliminated by a software update of the UH CPCI, DATA P/N 613- 3226-051. This software upgrade for UH CPCI is broken down into two load modules for reprogramming the EPROMs on the Local Bus Memory SRU and Processor SRU. The old part numbers for the programming data and programmed hardware (SRUs & LRU) are listed below.

DR NUMBER: 18952 Runoff

DESCRIPTION: When a receiver is keyed (while in operation) or transitions from an authorized to unauthorized to authorized mode the Selective Availability corrections for the individual SV in the data base may be corrupted through partial over writing of the Selective Availability corrections for one or more SV due to a software/computer interrupt. When an SV with corrupted SA corrections are selected for navigation, the corrupted data causes errors in the deterministic correction terms which translate to position errors in the navigation solution.

CAUSE: Data in SV data base being corrupted by a priority interrupt which may cause partial over writing of SV SA corrections.

RESOLUTION: Update CLDICUCTRL to reinitialize data when there is an interruption.

AFFECTED MODULES AND VERSION: CLDICUCTRL VERSION 7. XVABITINTR VERSION 01. Note: These modules are part of the Interface Processor software.

G021 PQDR NUMBER: WRLKN 96-0078 S (CDU Lockup - UH [R-2400] only)

DESCRIPTION: Control display unit (CDU) lockup whenever the receiver R2400 is tracking satellite PRN 30. The receiver continues to navigate, however the operator cannot control the CDU and therefore is unable to change the data displayed. The problem occurs only when satellite PRN 30 is in view.

CAUSE: The UH receiver continues to operate normally until SV30 is tracked. When this event happens, information about SV30 is stored between 0:97EF - 0:97FF. Recall that the three variables used by the CDU are stored at 0:97F7 - 0:97F9. By inspection we can see that the three critical variables can be erased when certain information about SV30 is written into the table. The 1HZ Navigation Task places the square of the predicted pseudo range (Variance) for the past second into a variable called NC'BIAS'SQ locations 0:97F6 and 0:97F7. This means that every second the variable BI'CDU'DISPLAY is over written by information used by the Kalman filter. When the CDU checks BI'CDU'DISPLAY, it is checking to see if it is zero (Not In Test Mode). It definitely not zero if SV30 is being tracked. The other variables are also over written and used in the CDU.

RESOLUTION: Update code to move BI'CDU'DISPLAY to an unused area of memory

DR # - none (Update Map Datums)

DESCRIPTION: Map datum tables in the R-2399 and R-2400 are not current and do not match those in newer nav equipment.

CAUSE: The Map Datum tables in the R-2399 and R-2400 are 1985 vintage; since they were implemented, two updates have been published by NIMA. These tables must be updated to comply with JPO policy.

RESOLUTION: Incorporate new Datum coefficients from DMA TR 8350.2 with Change 1 (9/93)

DR # - none (Update MagVar Coefficients)

DESCRIPTION: The MagVar coefficients in the R-2399 and R-2400 are not current and do not match those in newer nav equipment.

CAUSE: The MAGVAR coefficients in the R-2399 and R-2400 are 1985 vintage; since they were implemented, two updates have been published by NIMA. These tables must be updated to comply with JPO policy.

RESOLUTION: Incorporate new MAGVAR from DMA World Magnetic Model 1995 document.

Original JPO DRS # 13499A-J3A-9000005. (Inability to display, output PRN # 32)

DESCRIPTION: When receiver tracks PRN #32, track & nav are normal but display shows "00" instead of "32". Also affects several data interfaces

CAUSE: Several interfaces and CDU Manager limit PRN numbers to five bits, thus creating an inability to display or output PRN #32. With the constellation filling up quickly, we need to be able to use PRN #32 as a SV number.

RESOLUTION: - Modify interfaces and internal processes to use six bits for PRN #.

BLK 20. NEED FOR CHANGE:

Whenever the receiver tracks PRN 30, it no longer responds to CDU commands. This causes unacceptable difficulties in operational use. The possibility of a Navigation Run-off Anomaly (a large horizontal or vertical position error caused by corrupted data) exists inside the current receiver software. This could result in extreme variations in position and velocity.

BLK 30. CONFIGURATION ITEMS AFFECTED:

LRUs

Radio, Receiver, UH, R-2400F/A Part # 622-8075-050, NSN 5826-01-343-4083NS *
Radio, Receiver, UH, R-2400G/A Part # 622-8075-060, NSN 5826-01-343-4084NS
Radio, Receiver, OH, R-2399G/A Part # 622-8076-060, NSN 5826-01-343-1967NS

SRUs

UH 2400F/A, 2400G/A Local Bus Memory CCA 659-5463-050
UH 2400G/A AAMP Processor CCA 676-2504-060
UH 2400F/A CAPS Processor CCA 687-6523-050
UH 2400F/A 2-Channel Memory CCA659-5468-050
OH 2399G/A Local Bus Memory CCA 659-5464-050

OH 2399G/A AAMP Processor CCA 676-2505-060

NOTE: * Radio, Receiver, UH, R-2400F/A (Part Number 622-8075-050) will not be modified as part of this ECP. Before the new UH software can be loaded into receiver R-2400F/A (-050 configuration) it must be updated to the -060 configuration which involves a hardware modification.